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| 10/537,590 | 06/06/2005 | Zhen Liu | YOR920020238US1 | 5479 |

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| EXAMINER | |
|---|---|
| CEHIC, KENAN | |

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/537,590 | LIU ET AL. | |
| | Examiner | Art Unit | |
| | KENAN CEHIC | 2416 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *15 January 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *11-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *11-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

1. Claim 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Basu et al (US 2004/0071082) in view of, Nakagawa (WO 01/47181), Bechtolsheim et al (US 7,215,641) and Sang et al (US 6,401,147).

For claim 11, Basu discloses a method for routing packets (see fig. 1; section 0007-9) in a distributed network including a plurality of nodes (see section 0007 "each node"; see fig. 3), the nodes being coupled via links (see section 0002-4 "links…path between a source node and a destination…each link in the network."; section 0014…queues..nodes…links…"; see fig. 3) and the nodes having queues associated with the links (see section 0008 "packet queue lengths…various nodes..links"; section 0014 "queues are in face associated with network links"), the method comprising the steps of:

injecting a packet flow into the distributed network at a corresponding source node (see section 0031-34 "packet is received at node i….the packet naturally flow from its source to the destination"; section 0043 "send data packets…"),

equalizing the queues at each node of the distributed network (see section 0007-9 "packets are routed in accordance with ..potential function...direction of the lowest neighboring potential value...potential function…based on…packet queue lengths at the various nodes or links"; section 0028 "potential function…total potential function…"; see section 0031-37 "routed to…node having the greatest difference in values of the function…hypothetical electrostatic potential…takes a path…in the direction of local maximum electrostatic force...total potential…minimum total potential…" and see equation (5); see fig. 1 ); wherein an integer number of packets in each queue is maintained (see fig 2, 21 "packets waiting in my queue"; section 0038 "queue of data packets"; section 0040 "packets waiting in the queue")

pushing the packet flow in the distributed network such that packets are moved from a queue with a higher height to a queue with a lower height (see section 0007-9 "packets are routed in accordance with ..potential function...direction of the lowest neighboring potential value...potential function…based on…packet queue lengths at the various nodes or links"; section 0028 "potential function…total potential function…"; see section 0031-37 "routed to…node having the greatest difference in values of the function…hypothetical electrostatic potential…takes a path…in the direction of local maximum electrostatic force...total potential…minimum total potential…" and see equation (5); see fig. 1 ) and

absorbing the packet flow at a corresponding sink node such that heights of queues at the sink node are set to zero;

wherein each queue has a potential function (see section 0007-9 "packets are routed in accordance with ..potential function...direction of the lowest neighboring potential value...potential function…based on…packet queue lengths at the various nodes or links"; section 0028 "potential function…total potential function…"; see section 0031-37 "routed to…node having the greatest difference in values of the function…hypothetical electrostatic potential…takes a path…in the direction of local maximum electrostatic force...total potential…minimum total potential…" and see equation (5); see fig. 1 ) associated therewith, the potential function of a given queue being a function of the height of the given queue (see section 0007-9 "packets are routed in accordance with ..potential function...direction of the lowest neighboring potential value...potential function…based on…packet queue lengths at the various nodes or links"; see section 0022-27 "potential function…based directly on the packet queue lengths…"), and wherein packets are routed so as to minimize the sum of the potential functions of the queues of the nodes of the distributed network (see section 0007-9 "packets are routed in accordance with ..potential function...direction of the lowest neighboring potential value...potential function…based on…packet queue lengths at the various nodes or links"; section 0028 "potential function…total potential function…"; see section 0031-37 "routed to…node having the greatest difference in values of the function…hypothetical electrostatic potential…takes a path…in the direction of local maximum electrostatic force...total potential…minimum total potential…" and see equation (5); see fig. 1 ).

For claim 13, Basu discloses further comprising the step of a node receiving broadcast information from at least one neighboring node pertaining to the height of at least one queue of one neighboring node (see section 0030 "node sends updated packet queue length information to its neighboring nodes…"; section 0033 "updates…received from its neighboring nodes…").

Basu does not explicitly discuss the following:

For claim 11, wherein the packet flow is stored in an overflow buffer of the source node in response to a height of at least a given queue of the source node exceeding a threshold; pushing the packet flow based at least in part on respective energy reserves associated with affected nodes and an amount of energy required to move packets between the affected nodes, in a manner that substantially minimizes power dissipation at the affected nodes in order to prevent exhaustion of any energy reserve associated with an affected node;

For claim 12, the distributed network is a mobile ad-hoc network, and further wherein the node and at least one neighboring node communicate over a wireless link.

Nakagawa from the same or similar field of endeavor discloses the following features:

For claim 11, Nakagawa discloses pushing the signals in the distributed network such that packets are moved based at least in part on respective energy reserves associated with affected nodes and an amount of energy required to move packets between the affected nodes (see page 9 3rd para through page 10. "account is taken both available energy at each node and expected power consumption of each node to support each proposed

route…minimise power consumption….minimises power consumption…allows for increased battery life "; page 8 2nd para. " a required transmission power to support satisfactory communication…"; page 6-7 1st para."report…terminal's amount of stored enerrgy available for use in supporting the requested link and current movement vector…preserving energy reserves in devices having limited available energy" and page 2nd para. "amount of energy available…power consumption…expected minimum battery lifetimes" and page 12 claims 9,12 "power required for transmission of signals to those other nodes"), in a manner that substantially minimizes power dissipation at the affected nodes in order to prevent exhaustion of any energy reserve associated with an affected node (see page 9 3rd para through page 10. "account is taken both available energy at each node and expected power consumption of each node to support each proposed route…minimise power consumption….minimises power consumption…allows for increased battery life "; page 8 2nd para. " a required transmission power to support satisfactory communication…"; page 6-7 1st para."report…terminal's amount of stored enerrgy available for use in supporting the requested link and current movement vector…preserving energy reserves in devices having limited available energy" and page 2nd para. "amount of energy available…power consumption…expected minimum battery lifetimes" and page 12 claims 9,12 "power required for transmission of signals to those other nodes");

For claim 12, Nakagawa discloses the distributed network is a mobile ad-hoc network, and further wherein the node and at least one neighboring node communicate over a

wireless link (see fig. 3; pages 4-5 "wireless signals…ad-hoc communication network…bluetooth…mobile phone…wireless…")

Sang from the same or similar field of endeavor discloses the following features:

For claim 11, Sang discloses wherein the packet flow is stored in an overflow buffer of the node in response to a height of at least a given queue of the source node exceeding a threshold (see col 20 lines 3-25 "transferring entries to an overflow storage area if…exceeds the first threshold value…exceeds the second threshold value" and fig 7 ; S710-S720 or fig 8; S810-S822).

Bechtolsheim from the same or similar field of endeavor discloses the following features:

For claim 11, Bechtolsheim discloses absorbing the packet flow at a corresponding sink node (see fig 3; 300, 330, 302-340 and fig 4; 460, "Yes" and 410-470) that heights of queues at a sink node are set to zero (see fig 4; 460, "Yes" and 410-470 and col 12 lines 12-25 "stored buffer field...zero...no more packet from the flow remain in a queue)

It would have been obvious to one of the ordinary skill in the art at the time of the invention to modify the system of Nakagawa by using the features, as taught by Basu, Bechtolsheim , Sang et al; in order to provide in order to provide "queue structure and a method of queuing that will satisfy both competing interests of low latency and high capacity, that queues entries to a system with low latency, yet still retains the capacity to handle relatively large amounts of entries when necessary" (see Sang col 2); in order to provide "a scheme to rapidly identify good flows from bad (i.e., the well-behaved flows vs. the non-adapting aggressive flows) on a packet-by-packet basis (see Bechtolsheim col

4); in order to provide a an efficient route to be determined without requiring the use of a time-consuming iterative procedure (see Basu section 0002-8).

2. Claim 14 rejected under 35 U.S.C. 103(a) as being unpatentable over Basu et al (US 2004/0071082), Nakagawa (WO 01/47181), Bechtolsheim et al (US 7,215,641), Sang et al (US 6,401,147), as applied to claim 11, further in view of Waters et al. (US 20080132264)

For claim 14, Basu, Nakagawa, Bechtolsheim and Sang discloses the claimed invention as described above.

For claim 14, Basu discloses wherein the injecting, equalizing, pushing and absorbing steps are performed for a number of rounds (see section 0015 "calculated for each network node…"; section 0035; figs 1 and 3)

For claim 14, Nakagawa discloses performance requirements are substantially satisfied (see page 7 "paramters…as to achieve a desired level of performance in the network") substantially maximizing a time period prior to exhaustion of an energy reserve associated with an node of the distributed network (see page 9 3rd para through page 10. "account is taken both available energy at each node and expected power consumption of each node to support each proposed route…minimise power consumption….minimises power consumption…allows for increased battery life "; page 8 2nd para. " a required transmission power to support satisfactory communication…"; page 6-7 1st para."report…terminal's amount of stored enerrgy available for use in supporting the requested link and current movement vector…preserving energy reserves in devices having limited available energy" and page 2nd para. "amount of energy available…power

consumption…expected minimum battery lifetimes" and page 12 claims 9,12 "power required for transmission of signals to those other nodes").

Basu, Nakagawa, Bechtolsheim and Sang are silent about:

For claim 14, performance as throughput.

Krishnamurthy from the same or similar field of endeavor discloses the following features:

For claim 14, Krishnamurthy discloses performance as throughput (see abstract "throughput performance"; section 0054 "performance…end-to-end throughput…";section 0071 "performance…end to end throughput")

It would have been obvious to one of the ordinary skill in the art at the time of the invention to modify / combine the features of Basu, Nakagawa, Bechtolsheim and Sang by using the above recited features, as taught by Krishnamurthy, in order to provide reduced power consumption, enhanced data throughput, and reduced demand for node resources traditionally allocated for data reception and transmission (see Krishnamurthy sections 0002-10).

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KENAN CEHIC whose telephone number is (571)270-3120. The examiner can normally be reached on Monday through Friday 8:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, KWANG BIN YAO can be reached on (571) 272-3182. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Kenan Cehic/
Examiner, Art Unit 2416

/Kwang B. Yao/

Supervisory Patent Examiner, Art Unit 2416